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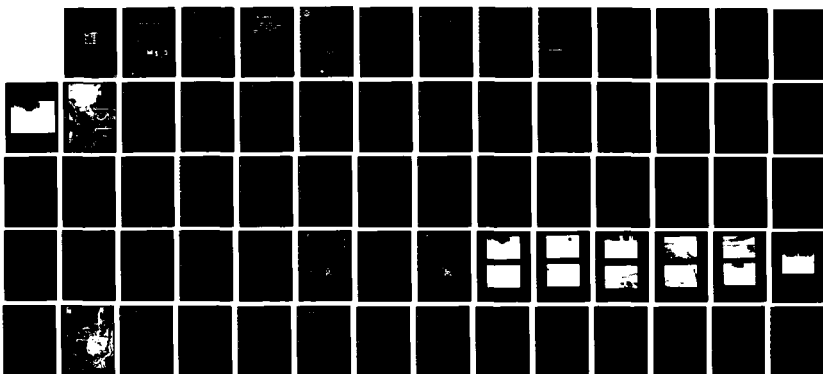
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
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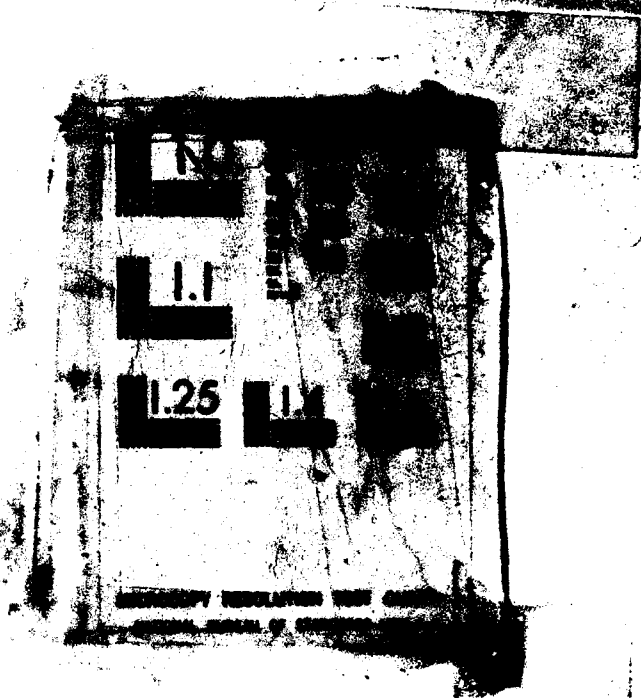
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RICHELIEU RIVER BASIN
RUTLAND, VERMONT

UPPER EDDY POND DAM
VT 00231

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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ELECTE
JUL 17 1985
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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earth embankment with a concrete core wall. The dam is 150 ft. long with a maximum height of 13 ft. The dam is small in size with a significant hazard potential. A major breach of the dam could cause appreciable property damage and the loss of a few lives in the area about 3500 ft. downstream of the dam site. A number of recommendations are given for implementation by the owner.		

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424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

AUG 11 1981

NEDED

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, VT 05602

Dear Governor Snelling:

Inclosed is a copy of the Upper Eddy Pond Dam (VT-00231) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Management and to the owner, Eddy Ice Company, North Clarendon, VT. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Management for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

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UPPER EDDY POND DAM

VT 00231

RICHELIEU RIVER BASIN
RUTLAND, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

**NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT**

Identification No.:	VT 00231
Name of Dam:	UPPER EDDY POND DAM
Town:	RUTLAND
County and State:	RUTLAND, VERMONT
Stream:	MUSSEY BROOK
Date of Inspection:	5 DECEMBER 1980

BRIEF ASSESSMENT

Upper Eddy Pond Dam is an earth embankment dam with a concrete core wall. The dam has a length of 160 feet and a height of 13 feet. There is an over-flow spillway with a crest length of 12 feet. The concrete crest is approximately 2.3 feet below the top of dam. At present there is about 3 inches of flashboard exposed above the concrete crest. There is a pond drain about 18 inches in diameter which is reported to be inoperable. The top of dam storage is estimated to be 51 acre-feet. The dam was originally constructed in the early 1900's for the purpose of forming an ice pond. Upper Eddy Pond now serves as a recreational water body. The dam appears to have had little maintenance in recent years. The portion of dam to the west of the spillway is covered by a rubbish dump. Based on the results of the visual inspection the condition of the dam is judged to be poor.

The dam has a small size and a significant hazard classification. The selected test flood is $\frac{1}{2}$ of the Probable Maximum Flood ($\frac{1}{2}$ PMF). The $\frac{1}{2}$ PMF is considered comparable in magnitude to the 100-year flood. The test flood inflow from the 1.0 square mile drainage area was estimated to be 550 cfs. Effects of reservoir storage would reduce the test flood inflow to a routed test flood outflow of 480 cfs which would overtop the dam by about 0.7 feet.

The capacity of the spillway with water at the top of dam is estimated to be 130 cfs which is 27% of the routed test flood outflow.

A major breach of the dam could cause appreciable property damage and loss of a few lives in the area about 3500 feet downstream of the damsite.

A number of recommendations are given for implementation by the owner. These recommendations should be implemented within 12 months of receipt of this Phase I Inspection Report.

Recommendations in general are as follows:

Retain a qualified Registered Professional Engineer to:

- Design procedures and supervise removal of trees from the dam and for at least 25 feet downstream of the embankment toes. The rubbish dump should be completely removed. This work should include design for regrading and vegetation of the embankment slopes.
- Design repairs to the pond drain and its access platform.

Upper Eddy Pond Dam

- Investigate conditions at the westerly embankment and westerly abutment and investigate and monitor seepage flows.
- Perform a detailed hydrologic and hydraulic analysis to determine the need for and methods to increase project discharge capacity.
- Design methods to protect the upstream slope against erosion.
- Design methods to protect the embankments and sides of the discharge channel against erosion by flows from the spillway.

The owner should carry out all the recommendations made by the engineer. Work should be done under the engineer's supervision.

In addition, the owner should also implement the recommended remedial program including the establishment of a formal program for operation and maintenance, including the operating mechanism for the pond drain and control of woody vegetation on the embankments; and establishment of a formal surveillance and downstream warning program. A qualified Registered Professional Engineer should also be engaged to make a comprehensive technical inspection of the dam once a year. Immediately upon receipt of this report, the owner should remove the existing flashboard in order to maximize the hydraulic capacity of the spillway.



John F. Cysz
John F. Cysz
Project Manager
VT P.E. No. 3592

This Phase I Inspection Report on Upper Eddy Pond Dam (VT-00231) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Joe W. Finegan

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

Aramast Mantesian

ARAMAST MANTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Letter of Transmittal	
Brief Assessment	
Review Board Page	
Preface	i
Table of Contents	ii-iv
Overview Photo	v
Location Map	vi

REPORT

1. PROJECT INFORMATION

1.1 General	1-1
a. Authority	1-1
b. Purpose of Inspection	1-1
1.2 Description of Project	1-1
a. Location	1-1
b. Description of Dam and Appurtenances	1-1
c. Size Classification	1-2
d. Hazard Classification	1-2
e. Ownership	1-2
f. Operator	1-2
g. Purpose of Dam	1-2
h. Design and Construction History	1-2
i. Normal Operation Procedures	1-3
1.3 Pertinent Data	1-3
a. Drainage Area	1-3
b. Discharge at Damsite	1-3
c. Elevation	1-4
d. Reservoir	1-4
e. Storage	1-4
f. Reservoir Surface	1-5
g. Dam	1-5
h. Diversion and Regulating Tunnel	1-5
i. Spillway	1-5
j. Regulating Outlets	1-6

<u>Section</u>	<u>Page</u>
2. ENGINEERING DATA	
2.1 Design Data	2-1
2.2 Construction Data	2-1
2.3 Operation Data	2-1
2.4 Evaluation of Data	2-1
a. Availability	2-1
b. Adequacy	2-1
c. Validity	2-1
3. VISUAL INSPECTION	
3.1 Findings	3-1
a. General	3-1
b. Dam	3-1
c. Appurtenant Structures	3-2
d. Reservoir Area	3-2
e. Downstream Channel	3-2
3.2 Evaluation	3-3
4. OPERATIONAL AND MAINTENANCE PROCEDURES	
4.1 Operational Procedures	4-1
a. General	4-1
b. Description of any Warning System in Effect	4-1
4.2 Maintenance Procedures	4-1
a. General	4-1
b. Operating Facilities	4-1
4.3 Evaluation	4-1
5. EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES	
5.1 General	5-1
5.2 Design Data	5-1
5.3 Experience Data	5-1
5.4 Test Flood Analysis	5-1
5.5 Dam Failure Analysis	5-2

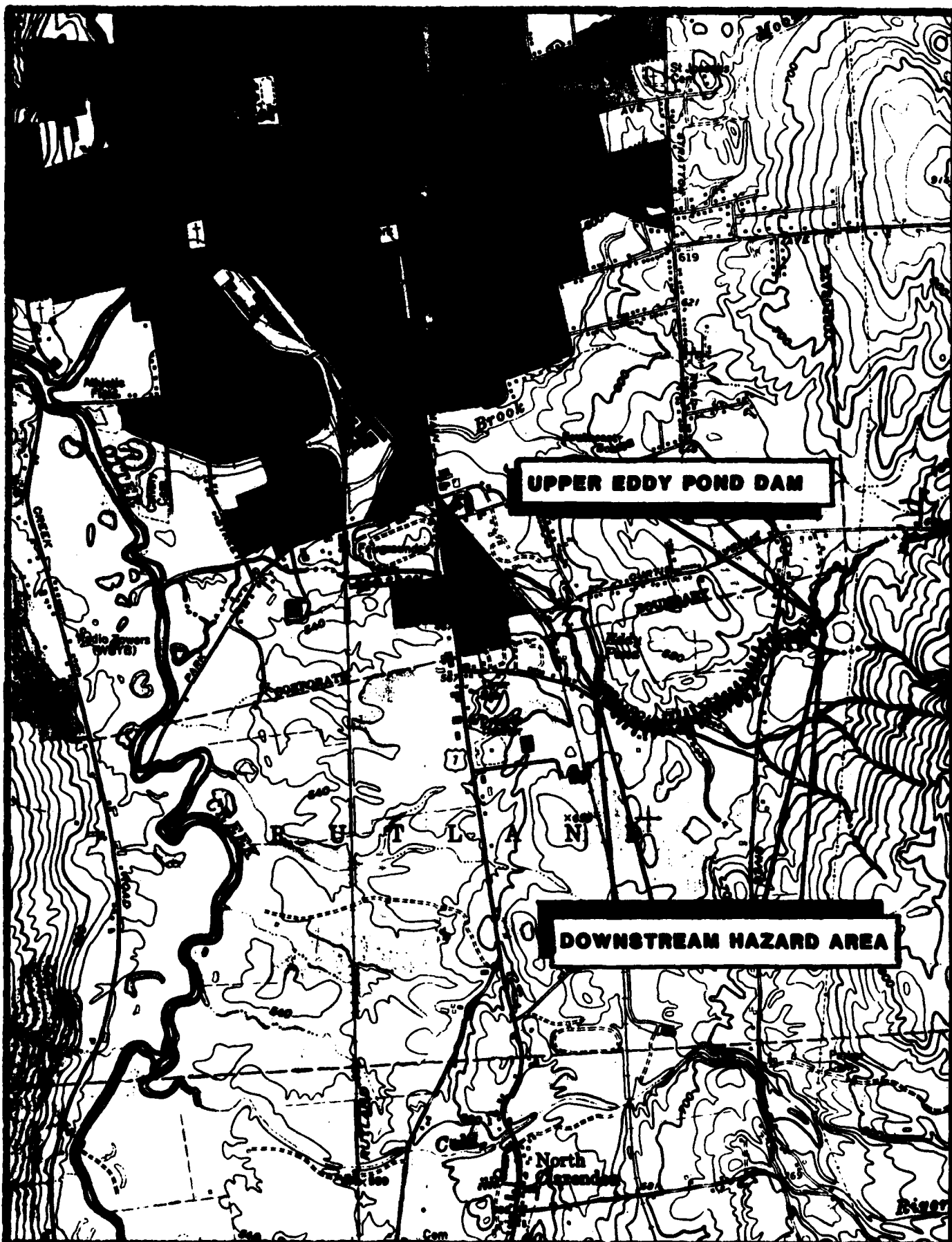
<u>Section</u>	<u>Page</u>
6. EVALUATION OF STRUCTURAL STABILITY	
6.1 Visual Observations	6-1
6.2 Design and Construction Data	6-1
6.3 Post-Construction Changes	6-1
6.4 Seismic Stability	6-1
7. RECOMMENDATIONS	
7.1 Dam Assessment	7-1
a. Condition	7-1
b. Adequacy	7-1
c. Urgency	7-1
7.2 Recommendations	7-1
7.3 Remedial Measures	7-2
a. Operation and Maintenance Procedures	7-2
7.4 Alternatives	7-2

APPENDICES

- APPENDIX A - INSPECTION CHECKLIST
- APPENDIX B - ENGINEERING DATA
- APPENDIX C - PHOTOGRAPHS
- APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS
- APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL
INVENTORY OF DAMS



OVERVIEW OF UPPER EDDY POND DAM



UPPER EDDY POND DAM

RUTLAND, VT.

Identification No. VT 00281



LOCATION PLAN

Rutland Quadrangle

1:24000

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
UPPER EDDY POND DAM
SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising inspection of Dams within the New England region. Robert G. Brown & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the Commonwealth of Massachusetts and State of Vermont. Authorization and notice to proceed were issued to Robert G. Brown & Associates, Inc. under a letter of 23 October 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract Number DACH33-81-C-0004 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

- (1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten public safety and thus permit correction in a timely manner by non-Federal interests.
- (2) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.
- (3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location

Upper Eddy Pond Dam is located in the Town of Rutland, Vermont. A small portion of the pond is located in the City of Rutland. The dam is on Mussey Brook approximately 2.3 miles upstream from the brook's confluence with Otter Creek. The dam impounds Upper Eddy Pond which is used for recreation. Upper Eddy Pond Dam is shown on the USGS Rutland, Vermont quadrangle at latitude 43° 35.5' and longitude 72° 56.9'. Access to the damsite is from Stratton Road.

b. Description of Dam and Appurtenances

Upper Eddy Pond Dam is an earth fill dam, approximately 160 feet long, with a maximum hydraulic height of about 13 feet, measured from the top of the dam to the bottom of the stream channel at the toe of the dam. The dam has a top width of about 10 feet. The axis of the dam is oriented in a general east/west direction. The downstream slope is approximately 2H to 1V with localized areas being slightly steeper. The upstream slope above the level of the pond is irregular and has a general slope of 2H to 1V.

Upper Eddy Pond Dam

There is an overflow spillway located to the west of the dam center. The spillway is 12 feet long and has a concrete crest elevation about 2.3 feet below the top of dam. There are concrete walls on each end of the spillway which have slots for flashboards (see Photograph 2, Appendix C). The concrete spillway walls and crest are formed by a 4-foot wide concrete core wall in the center of the embankment (see Appendix B). It is reported by the owner that the core wall extends to each abutment. The owner also reports that there is a second concrete core wall in the upstream slope of the dam, but this could not be confirmed during the visual inspection.

Overflow from the spillway discharges onto a rockfill slope (see Photographs 1 and 6, Appendix C) and then to a natural channel in the wooded area below the dam. There is more recent concrete slope pavement at the approach to spillway. There is a pond drain which passes through the embankment just to the west of the spillway. The conduit appears to be about 18 inches in diameter upstream of the core wall and 21 inches in diameter downstream of the core wall. There is a gate valve with a Tee-bar handle near the upstream end of the conduit (see Photograph 9, Appendix C). Previously there was a footbridge extending from the embankment out into the pond to the Tee-bar handle. There is no footbridge at present.

c. Size Classification

The size classification of this dam is small according to the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. The impoundment storage at the top of the dam is 51 acre-feet (within the range of 50 to 1000 acre-feet) and the maximum hydraulic height of the dam is 13 feet (less than 40 feet). The size classification is based on the storage and height criteria.

d. Hazard Classification

The dam is in a significant hazard category because a major breach of the dam would be likely to cause appreciable property damage and the loss of a few lives. (See Section 5.5.)

e. Ownership

The dam was built for and previously owned by Eddy Ice Company, according to the current owner, Mr. Norman Spafford, Cold River Road, North Clarendon, VT 05759. Tel.: (802) 773-6289.

f. Operator

There is no operation presently associated with the dam. The owner performs any work required.

g. Purpose of Dam

Upper Eddy Pond Dam impounds Upper Eddy Pond which is presently used for recreation by the owner. The pond was originally constructed for use in ice harvesting by the Eddy Ice Company.

h. Design and Construction History

According to the current owner, Mr. Norman Spafford, the dam was built about 1900. It was built for the Eddy Ice Company and may have been constructed by the company itself. No plans, specifications or construction records were available. There are no available records of any post-construction changes or repairs available from the owner, the Town or City of Rutland, or the Vermont Department of Water Resources.

Upper Eddy Pond Dam

1. Normal Operation Procedures

There are presently no operation procedures associated with the dam. In the past, flashboards were inserted in the spillway to regulate the water level. This is no longer done according to the owner. The pond drain was last operated about ten years ago. Mr. Spafford stated that the gate is no longer operable. The Tee-bar handle gate key is still in-place in the pond. The footbridge to reach the gate key is rotted out.

There are no established maintenance procedures for the dam. The embankment is overgrown with trees. The downstream face of the dam near the west abutment has been used as a trash dump in the past.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area contributing to Upper Eddy Pond is 1.0 square mile. The drainage area is oriented with its long axis in an east/west direction and has a length of 1.7 miles and an average width of 0.6 mile. Approximately 30% of the watershed lies in the Town of Rutland with the remaining 70% lying in the Town of Mendon. Discharge from Upper Eddy Pond is to Mussey Brook.

Approximately 80% of the drainage area is wooded. The remaining 20 percent is pasture and scattered residential development. Several rural roads and a power line transect the area. The topography varies from low rolling terrain in the lower one-half of the watershed to moderate and steep slopes in the upper half. Elevations vary from 655 at Upper Eddy Pond to 2090 on Bald Mountain.

There are no other significant water bodies in the watershed. The pond area plus surrounding wetland areas comprise about 3 percent of the total drainage area.

b. Discharge at Damsite

Discharges at the damsite are over the concrete overflow spillway and through an 18" pond drain (reported to be inoperable). There is one flashboard 3" high in the spillway with slots for additional flashboards.

The elevation datum used in this report is National Geodetic Vertical Datum of 1929 (NGVD), based on an interpolated water level elevation of 655 on the USGS quadrangle.

- (1) Outlet Works - 18"± diameter pond drain upstream of core wall, invert elevation unknown; 21" diameter downstream of core wall, invert elevation of outlet 644±; gate valve on upstream end of pond drain is reported inoperable.
- (2) Maximum Flood at Damsite - Flood of Record, November 1927, according to state records.
- (3) Ungated Spillway Capacity at Top of Dam (without flashboards) - 130 cfs at 657.3 NGVD.
- (4) Ungated Spillway Capacity at Test Flood Elevation (without flashboards) - 193 cfs at 658.0 NGVD.

Upper Eddy Pond Dam

- (5) Gated Spillway Capacity at Normal Pool Elevation - not applicable.
- (6) Gated Spillway Capacity at Test Flood Elevation - not applicable.
- (7) Total Spillway Capacity at Test Flood Elevation (without flashboards) - 193 cfs at 658.0 NGVD.
- (8) Total Project Discharge at Top of Dam - 130 cfs at 657.3 NGVD.
- (9) Total Project Discharge at Test Flood Elevation - 480 cfs at 658.0 NGVD.

c. Elevation (feet above NGVD)

- (1) Streambed at Toe of Dam - 644±.
- (2) Bottom of Cutoff - unknown.
- (3) Maximum Tailwater - unknown.
- (4) Normal Pool - 655.0 (interpolated from USGS quadrangle).
- (5) Full Flood Control Pool - not applicable.
- (6) Spillway Crest - 655.0.
- (7) Design Surcharge (Original Design) - unknown.
- (8) Top of Dam - 657.3.
- (9) Test Flood Surcharge - 658.0.

d. Reservoir (length in feet)

- (1) Normal Pool - 850'.
- (2) Flood Control Pool - not applicable.
- (3) Spillway Crest Pool - 850'.
- (4) Top of Dam - 1000'.
- (5) Test Flood Pool - 1100'.

e. Storage (acre-feet)

- (1) Normal Pool - 26.
- (2) Flood Control Pool - not applicable.
- (3) Spillway Crest Pool - 26.
- (4) Top of Dam - 51.
- (5) Test Flood Pool - 59.

Upper Eddy Pond Dam

f. Reservoir Surface (acres)

- (1) Normal Pool - 6.
- (2) Flood Control Pool - not applicable.
- (3) Spillway Crest - 6.
- (4) Top of Dam - 10.
- (5) Test Flood Pool - 11.

g. Dam

- (1) Type - earth embankment, gravity.
- (2) Length - 160 feet.
- (3) Height - 13 feet.
- (4) Top Width - 10 feet.
- (5) Side Slopes - 2H:1V.
- (6) Zoning - unknown.
- (7) Impervious Core - concrete core wall on centerline of dam reported to extend entire length; a second concrete core wall is reported to be located approximately 20' upstream.
- (8) Cutoff - unknown.
- (9) Grout Curtain - unknown.
- (10) Other - the westerly abutment is formed of a broad, gently sloping fill area.

h. Diversion and Regulating Tunnel - not applicable.

i. Spillway

- (1) Type - concrete overflow.
- (2) Length of Weir - 12 feet.
- (3) Crest Elevation - 655.0 NGVD without flashboards, 655.2 NGVD with one flashboard.
- (4) Gates - none.
- (5) U/S Channel - concrete paved approach channel from pond, 7 feet long.

Upper Eddy Pond Dam

- (6) D/S Channel - concrete paved chute for 10' downstream sloped about 2½H:1V, dumped rock fill slope about 7½ feet high to about 20' downstream to stream channel.
- (7) General - discharge flows through and behind rock fill of spillway channel.

j. Regulating Outlets

- (1) Invert - 644±.
- (2) Size - 18" diameter upstream of the core wall and 21" diameter downstream of the core wall.
- (3) Description - riveted steel (boiler tube).
- (4) Control Mechanism - Tee-bar handle gate key for sluice gate, reported to be inoperable.

SECTION 2 ENGINEERING DATA

2.1 DESIGN DATA

No design data for the original construction or for any subsequent repairs were available.

2.2 CONSTRUCTION DATA

No construction records for the original construction or for any subsequent repairs were available.

2.3 OPERATION DATA

No written records of operation or maintenance were available. A Vermont Dam Inspection Report dated May 1952 is available from the Department of Water Resources.

2.4 EVALUATION OF DATA

a. Availability

No engineering data were available from the owner, the Town, City and County of Rutland, or from the State, except for a 1952 inspection report. The construction and operation information included in this report was derived from interviews of the current owner.

b. Adequacy

The lack of in-depth engineering data does not allow a definitive review. Therefore, the condition of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based on the visual inspection, the dam's past performance, and sound engineering judgment.

c. Validity

No engineering data for the original construction were available to validate.

Upper Eddy Pond Dam

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General

Upper Eddy Pond Dam was inspected on December 5, 1980. The weather was clear, temperature around 30°F. At the time of inspection, there was a 3-inch high flashboard in-place at the spillway crest. Water was flowing about 1 inch over the flashboard. The upstream slope could therefore only be observed above this level.

The general layout of Upper Eddy Pond Dam is shown in Appendix B. Photographs showing features and conditions at the dam are included in Appendix C.

b. Dam
(1)

Crest - There are several low areas (6"±) in the crest. The embankment upstream of the core wall east of the spillway is approximately 4 inches lower than the top of the core wall. There is a footpath along the crest of the easterly embankment. The core wall is exposed for about 12 feet east of the spillway and for about 30 feet west of the spillway. There are 12-inch deep cracks in the crest at the westerly abutment (see Photograph 7, Appendix C). These cracks appear related to the debris dump visible on the downstream slope at this location.

- (2) Upstream Slope - There is a heavy growth of brush and small trees on the upstream slope of the embankment east of the spillway. There are irregularities in the upstream slope, particularly on the westerly embankment which appear to be caused by undercutting of the embankment at the normal water level. The depth of undercutting is presently about 6 inches.

The upstream slope at the entrance to the spillway is paved with concrete. There is about a 1-inch separation between the concrete slope pavement and the exposed core wall at the sides of the spillway (see Photographs 2 and 3, Appendix C).

The owner reports that there is another concrete core wall in the upstream slope of the dam. This could not be confirmed during the visual inspection.

- (3) Downstream Slope - The easterly embankment has small and large trees on the downstream slope. There is minor rust color seepage (1 gpm estimated) from the east side of the discharge channel downstream of the spillway.

There is a rubbish dump which includes vehicle bodies (see Photographs 4 & 5, Appendix C) on the downstream slope of the westerly embankment. There are also 2 large trees growing out of the westerly embankment, downstream slope. There are large voids in the rubbish

Upper Eddy Pond Dam

fill and there is an area of rust colored seepage (about 5 gpm) at the base of the dump (see Photograph 8, Appendix C). Cracks in the embankment crest at the westerly abutment may be related to lateral movement and/or settlement of the rubbish fill.

c. Appurtenant Structures

- (1) Spillway - The concrete sidewalls of the spillway are a part of the concrete core wall. The core wall also appears to be continuous under the spillway (see Photograph 2, Appendix C). There is spalling of the concrete at the corners where the concrete sides join the concrete crest. There is about 3 inches of exposed flashboard above the concrete crest. Small trees growing on the upstream slope of the easterly embankment overhang the approach to the spillway. There is a barbed wire fence just upstream of the spillway crest (see Photographs 2 and 6, Appendix C).

Immediately downstream of the spillway crest, the discharge flows over a rock fill slope. The rock fill has been covered with concrete for about 10 feet downstream of the spillway crest to form a chute. There is dislocation of the rock fill downstream of the spillway where the rock fill ties into the easterly and westerly embankments. There is an accumulation of timbers and other heavy debris at the base of the rock fill about 20 feet downstream of the spillway crest (see Photograph 1, Appendix C).

- (2) Pond Drain - The pond drain is reported to be inoperable at present. The Tee-bar handle for the gate valve is located in the pond about 20 feet out into the water. There is no footbridge extending out to the valve handle. The drain conduit appears to be about 18 inches in diameter upstream of the concrete core wall. No flow was observed from this section of the drain conduit. At the core wall the conduit size changes to 21 inches in diameter. The 21-inch conduit butts up to the core wall. There is about 10 gpm of leakage into the easterly side of the 21-inch conduit approximately 10 to 15 feet upstream of the outlet. The conduit projects from toe of the embankment west of the spillway (see Photograph 1, Appendix C).

d. Reservoir Area

The shore of the pond is primarily wooded. There are no structures located on the shore other than a cottage beyond the west abutment of the dam. This structure is about 3 feet above the top of the dam. There is a wetland area of about 3 acres at the northerly end of the pond (see Photograph 9, Appendix C).

e. Downstream Channel

Discharge from the spillway and the pond drain is to a natural channel which flows through a wooded area downstream of the dam. There is an accumulation of timbers and other heavy debris about 20 feet downstream of the spillway

crest. There are several trees overhanging the channel downstream of the dam, but these would not affect the discharge capacity of the spillway. The valley section downstream of the dam is generally U-shaped, about 150 feet wide. The stream channel drops about 15 feet within 800 feet from the toe of the dam.

3.2 EVALUATION

Based on the visual inspection, Upper Eddy Pond Dam is judged to be in poor condition. Several deficiencies were noted, which if not remedied could lead to serious problems.

Major areas of concern are:

- (1) The rubbish dump on the downstream slope of the westerly embankment obscures the embankment and precludes a detailed inspection. The cracks in embankment crest at the westerly abutment may be related to lateral movements and/or settlement of the rubbish fill. The dumped material should be removed and the embankment regraded. The seepage area at the toe of the westerly embankment requires further investigation after the embankment is exposed. The seepage at the base of the easterly embankment appears to be minor at present and may be related to surface drainage, but this should be investigated further and monitored.
- (2) The growth of trees on the embankment slopes are a threat to the dam because they weaken the embankment and can cause cracking and other distress in the concrete core wall or cause blockage of the spillway. The barb wire fence across the spillway should also be removed to minimize potential spillway blockage.
- (3) The pond drain should be repaired and made operable in order to provide a means of draining the pond in the event of an emergency. A means of access to the operating mechanism for the drain should be provided.
- (4) Low areas in the embankment crest require grading in order to allow surface water to drain from the embankment.
- (5) The upstream slope of the dam should be restored to a uniform alignment and protected against erosion and loss of embankment material.
- (6) The sides of the channel for a distance downstream of the spillway crest and toe of the dam should be protected against erosion by the spillway discharge.

A complete listing of Recommendations and Remedial Measures are given in Section 7.

Upper Eddy Pond Dam

SECTION 4 OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES

- a. General
Operational procedures for the project are not established. The dam appears to receive little maintenance.
- b. Description of any Warning System in Effect
There is no surveillance or warning system in effect for this dam.

4.2 MAINTENANCE PROCEDURES

- a. General
There is no formal maintenance plan for the project. The only regular maintenance carried out is mowing of the westerly embankment crest. The concrete slope pavement at the approach to the spillway appears to have been constructed within the past 10 years. The pond was last drained about 10 years ago.
- b. Operating Facilities
There are no established maintenance procedures for the operating facilities. The pond drain valve is reported to be inoperable.

4.3 EVALUATION

A formal written operational and maintenance plan, including an annual comprehensive technical inspection by a qualified Registered Professional Engineer, should be developed to insure that problems that are encountered can be remedied within a reasonable period of time. A formal written surveillance and downstream warning (emergency preparedness) plan should be established for this structure.

The pond drain should be made operational so that the pond could be drained in the event of an emergency.

Upper Eddy Pond Dam

SECTION 5 EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL

The drainage area contributing to Upper Eddy Pond is 1.0 square mile. The drainage area is oriented with its long axis in an east/west direction and has a length of 1.7 miles and an average width of 0.6 mile. Approximately 30% of the watershed lies in the Town of Rutland with the remaining 70% lying in the Town of Mendon. Discharge from Upper Eddy Pond is to Mussey Brook.

Approximately 80% of the drainage area is wooded. The remaining 20 percent is pasture and scattered residential development. Several rural roads and a power line transect the area. The topography varies from low rolling terrain in the lower one-half of the watershed to moderate and steep slopes in the upper half. Elevations vary from 655 at Upper Eddy Pond to 2090 on Bald Mountain.

There are no other significant water bodies in the watershed. The pond area plus surrounding wetland areas comprise about 3 percent of the total drainage area.

5.2 DESIGN DATA

No hydraulic or hydrologic design data or criteria were available.

5.3 EXPERIENCE DATA

There is no evidence of recent overtopping of the dam; however, the low areas in the crest could have been caused by past overtopping. 1927 is the maximum flood of record in this watershed; however, there are no flow records for this location. According to the present owner, higher flashboards were once used at this dam. These flashboards reportedly were designed to yield.

5.4 TEST FLOOD ANALYSIS

Upper Eddy Pond Dam is classified as small size having a hydraulic height of 13 feet and a top of dam storage of 51 acre-feet. Using the Recommended Guidelines for Safety Inspection of Dams, the test flood range is 100-year to 50% of the Probable Maximum Flood ($\frac{1}{2}$ PMF). Because of the dam's small height and small impoundment the $\frac{1}{2}$ PMF was chosen as the test flood. For the purpose of this analysis the $\frac{1}{2}$ PMF is considered comparable in magnitude to the 100-year flood. The analysis assumes that the dam remains intact during the test flood. The Probable Maximum Flood was estimated using methods contained in "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Investigations" issued by the New England Division Corps of Engineers. A curve value $\frac{1}{3}$ between mountainous and rolling terrain was used in this estimate.

The $\frac{1}{2}$ PMF test flood inflow from the 1.0 square mile drainage area was estimated to be 550 cfs. Storage effects would reduce the test flood inflow to a routed test flood outflow of approximately 480 cfs.

Upper Eddy Pond Dam

During test flood conditions, water would rise to elevation 658.0 which is about 0.7 feet above the top of dam. Water would be passing over the spillway crest at a depth of approximately 3 feet. In this analysis it was assumed that the pond level at the start of the test flood routing was at the concrete spillway crest and the existing 3" flashboard was removed.

The capacity of the spillway with water at the top of dam elevation is 130 cfs which is 27% of the routed test flood outflow. Overtopping of the dam could lead to a breach by erosion.

5.5 DAM FAILURE ANALYSIS

The impact of failure of the dam was assessed using Corps of Engineers "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs". The estimate assumes:

- a. the reservoir surface is at the top of the dam at the time of the breach, and
- b. a breach of 40% of the dam length at mid-height occurs (36 feet).

The estimated discharge resulting from the breach would be approximately 2840 cfs, which when added to the antecedent flow of approximately 130 cfs gives a total downstream breach flow of 2970 cfs.

Approximately 800 feet downstream of the damsite, Mussey Brook crosses under Cold River Road/Stratton Road in a 7.5-foot diameter CMP culvert. Water from the breach would cause water to flow over the low point in the road at a depth of about 2 feet. Storage in the valley section upstream of this road would cause about a 15% reduction in the breach flow. There are presently no structures in this area.

About 3000 feet downstream of the damsite there is a small private bridge with an opening about 12 feet wide and 7 feet high. There is a house at this location. Water from the breach could cause 1 or 2 feet of flooding around the house but water would probably not reach the first floor level. Prior to the breach water would be about 10 feet below the house sill.

Approximately 3500 feet downstream of the damsite Mussey Brook crosses under Cold River Road in a concrete box culvert having an opening about 10 feet wide and 8 feet high. Water from the breach would cause water to flow over the road at a depth of about 1.5 feet. There is one home in this area at the road level and one home which has a sill about 2 feet below the road. These homes could be damaged by impact and flooding. Loss of a few lives could be possible. Prior to the breach, water would be at a level about 7 feet below the road.

Below this area Mussey Brook enters Lower Eddy Pond (VT 00230). Because of the potential for damage to downstream property and the potential for loss of a few lives, the dam was classified Significant Hazard.

Upper Eddy Pond Dam

SECTION 6 EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATION

The downstream slope of the westerly embankment and the westerly abutment are covered by a rubbish dump. There are cracks in the embankment crest at the westerly abutment which may be related to lateral movements and/or settlements in the rubbish fill. Rust colored seepage approximately 5 gpm is emanating from the base of the rubbish. The condition of the westerly embankment should be evaluated after removal of the rubbish which now precludes a detailed inspection.

The growth of trees on the upstream and downstream embankment slopes are a threat to the dam because uprooting of large trees could lead to a breach of the dam. Also the root systems could cause cracking and other distress in the concrete core wall.

6.2 DESIGN AND CONSTRUCTION DATA

No design or construction records for the original construction (early 1900's) were available through present or previous owners, local or state sources.

6.3 POST-CONSTRUCTION CHANGES

There is concrete slope pavement on the upstream slopes at the approach to the spillway. This work appears to have been done within the last 10 years. The owner reports that yielding type flashboards were once used to control the level of the pond. At present, there is 3 inches of exposed flashboard above the concrete spillway crest.

6.4 SEISMIC STABILITY

The dam is located in Seismic Zone No. 2 and in accordance with the recommended Phase I guidelines, does not warrant seismic analysis.

Upper Eddy Pond Dam

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition

The Phase I visual inspection of Upper Eddy Pond Dam indicates that the dam is in poor condition. A number of deficiencies were observed which, if not remedied, could develop into hazardous conditions.

The adequacy of the spillway was tested and it was determined that the dam cannot pass the test flood without overtopping.

b. Adequacy of Information

The condition of this dam was assessed based primarily on visual inspection, past performance history and sound engineering judgment.

c. Urgency

The recommendations and remedial measures described in Paragraphs 7.2 and 7.3 should be implemented by the owner within 12 months after receipt of this Phase I Inspection Report.

7.2 RECOMMENDATIONS

The owner should retain a qualified Registered Professional Engineer to:

- (1) Design procedures and supervise the removal of trees from the dam and for at least 25 feet downstream of the embankment toes. Resulting depressions should be backfilled with appropriate materials. The rubbish dump should be completely removed. The design should include regrading of the embankment slopes and crest and establishment of an erosion resistant vegetation. Cracks in the embankment crest at the westerly abutment should be investigated and repairs designed.
- (2) Design repairs to the pond drain and its access platform.
- (3) Investigate the seepage through the downstream face of the embankments both under the existing dump to the west of the spillway and at the toe of the easterly embankment at the spillway discharge channel. A monitoring program should be established. A toe drainage system should be designed and constructed if necessary. The limits of the concrete core wall should be determined as part of this investigation.
- (4) Perform a detailed hydrologic and hydraulic analysis to determine the need for and methods to increase project discharge capacity. The feasibility of constructing an emergency spillway should be evaluated.

Upper Eddy Pond Dam

- (5) Design methods to protect the upstream slope against erosion and loss of embankment material. The existence, location and condition of the second core wall should be investigated.
- (6) Design methods to protect the embankments and sides of the discharge channel against erosion by flows from the spillway.

The owner should carry out all the recommendations made by the engineer. Work should be done under the engineer's supervision.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures

The owner should implement the following remedial measures:

- (1) Establish a formal written program for operation and maintenance including exercising and servicing of the pond drain operating mechanism and monitoring of seepage flows. Also a program for control of woody vegetation on the embankments should be established.
- (2) Provide round-the-clock surveillance during periods of unusually heavy precipitation.
- (3) Develop a formal written program for warning downstream residents in case of emergency (emergency preparedness program).
- (4) Engage a qualified Registered Professional Engineer to make a comprehensive technical inspection once a year.
- (5) Clear the spillway discharge channel of accumulated heavy debris.
- (6) Repair areas of spalled concrete on the spillway walls.
- (7) Remove the barbed wire fence that spans the spillway because the wire could cause debris to accumulate and obstruct flow through the spillway.
- (8) Remove the existing flashboard in order to maximize the hydraulic capacity of the spillway. This should be done immediately upon receipt of this Phase I Inspection Report.

7.4 ALTERNATIVES

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL INSPECTION CHECKLIST

Upper Eddy Pond Dam

VISUAL INSPECTION PARTY ORGANIZATION
NATIONAL DAM INSPECTION PROGRAM

DAM: Upper Eddy Pond Dam VT 00231

DATE: 5 December 1980

TIME: 1:00 p.m.

WEATHER: Clear, 25°F

W.S. ELEV. 655.2 U.S. 644 DN.S.

ELEV. DATUM: NGVD interpolated from water surface elevation
of 655 on USGS quadrangle.

INSPECTION PARTY:

1. J. F. Cysz, P.E. (Hydrology/Hydraulics)
2. J. E. Walsh, P.E. (Baystate Environmental Consultants, Inc.)(Geotechnical)
3. R. E. Hoogs (Measurements)
4. _____
5. _____
6. _____

OTHERS PRESENT DURING INSPECTION:

1. Norman Spafford (during interview at site on 14 November 1980)
2. _____
3. _____
4. _____

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	657.3±.
Current Pool Elevation	655.2 interpolated from USGS quadrangle.
Maximum Impoundment to Date	Unknown.
Surface Cracks	Yes, at westerly abutment (see photo).
Pavement Condition	No pavements.
Movement or Settlement of Crest	Several low areas - 0.5'±.
Lateral Movement	Lateral movement of westerly downstream slope at old dump.
Vertical Alignment	Varies within 0.5'±.
Horizontal Alignment	Minor variations on upstream slope of easterly embankment. Concavity on upstream slope of westerly embankment (see Appendix B).
Condition at Abutment and at Concrete Structures	Concrete core wall extends from spillway sides into embankments. 4" settlement and voiding on upstream side of easterly core wall.
Indications of Movement of Structural Items on Slopes	1" space between spillway walls and concrete surfaced slopes at entrance to spillway.
Trespassing on Slopes	Dump on downstream slope at westerly end of dam. Footpath on crest of easterly embankment.
Vegetation on Slopes	Heavily treed.
Sloughing or Erosion of Slopes or Abutments	Dump obscures inspection of westerly embankment. Erosion on 2 areas of upstream slope of easterly embankment.

(cont'd. next page)

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231

DATE: December 5, 1980

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u> (cont'd.)	
Sloughing or Erosion of Slopes or Abutments (cont'd.)	Erosion and settlement in boulder areas on downstream slope on both sides of spillway. Possible sloughing (6" undercut) of embankment at normal pool. Concave area upstream slope of westerly embankment (see Appendix B).
Rock Slope Protection - Riprap Failures	No riprap observed. Randomly dumped boulders on both sides of spillway on downstream face.
Unusual Movement or Cracking at or near Toes	None observed on easterly embankment. Westerly embankment obscured by dump.
Unusual Embankment or Downstream Seepage	Rust color seepage from debris in dump at westerly embankment (5 gpm estimated). Minor rust color seepage from east side of channel downstream of spillway.
Piping or Boils	None observed.
Foundation Drainage Features	None.
Toe Drains	None.
Instrumentation System	None.

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE

Intake channel and intake structure are
not visible.

a. Approach Channel

Slope Conditions

Bottom Conditions

Rock Slides or Falls

Log Boom

Debris

Condition of Concrete Lining

Drains or Weep Holes

b. Intake Structure

Condition of Concrete

Stop Logs and Slots

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - CONTROL TOWER

a. Concrete and Structural

General Condition

Condition of Joints

Spalling

Visible Reinforcing

Rusting or Staining of
Concrete

Any Seepage or Efflorescence

Joint Alignment

Unusual Seepage or Leaks in
Gate Chamber

Cracks

Rusting or Corrosion of Steel

b. Mechanical and Electrical

Air Vents

Float Wells

Crane Hoist

Elevator

Hydraulic System

Service Gates

Emergency Gates

Lightning Protection System

Emergency Power System

Wiring and Lighting System in
Gate Chamber

No control tower. Gate valve has T-bar handle 20' upstream of face of dam. Access bridge for gate operator is destroyed. Gate valve reported by owner to be inoperable. Gate is in closed position at present. Inspection through outlet pipe indicates gate is not leaking.

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED

CONDITION

OUTLET WORKS - TRANSITION AND CONDUIT

General Condition

Rust or Staining on Concrete

Spalling

Erosion or Cavitation

Cracking

Alignment of Monoliths

Alignment of Joints

Numbering of Monoliths

Conduit is about 18" diameter upstream of and through core wall. Then changes to 21" CIP from core wall (butt joint) to outlet. There is no flow from 18" conduit, leakage into easterly side of 21" conduit 10' to 15' upstream of outlet. Top of 21" pipe dented. Outlet of 21" conduit is submerged 6".

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	Note: 21" conduit projects from toe of slope west of spillway and dis- charges into spillway discharge channel. No headwall for outlet.
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	Outlet of 21" conduit is submerged about 6".
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	Yes, trees, dump debris west of channel.
Condition of Discharge Channel	Broad U-shaped valley section. General condition is satisfactory.

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED	CONDITION
----------------	-----------

OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS

a. Approach Channel

General Condition	OK - pond. Barb wire fence should be removed.
Loose Rock Overhanging Channel	None observed.
Trees Overhanging Channel	Yes, small trees at east of spillway.
Floor of Approach Channel	OK. Recent poured concrete slope protection at entrance to spillway.

b. Weir and Training Walls

General Condition of Concrete	Fair
Rust or Staining	Minor
Spalling	Yes, on east side, especially where spillway walls meet floor of chute.
Any Visible Reinforcing	None.
Any Seepage or Efflorescence	None.
Drain Holes	None.

c. Discharge Channel

General Condition	Satisfactory - minor erosion to east at end of spillway.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	Yes.
Floor of Channel	U-shaped valley - natural conditions.
Other Obstructions	Heavy timbers, boulders and other debris at end of spillway chute.

Note: Spillway has slots for stop logs - 3" high stop log in place.

VISUAL INSPECTION CHECKLIST

DAM: Upper Eddy Pond Dam VT 00231 DATE: December 5, 1980

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u>	
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

There is no service bridge for gate valve for outlet works. Bridge is destroyed - couple of wood post piers remain. No spillway bridge.

APPENDIX B

ENGINEERING DATA

	<u>Page Number</u>
LIST OF AVAILABLE DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS	B-1
PREVIOUS INSPECTION REPORTS	B-2 to B-3
PLANS, SECTIONS AND PROFILES	B-4 to B-5
BORING LOGS	None

**LIST OF AVAILABLE DESIGN,
CONSTRUCTION AND MAINTENANCE RECORDS**

A. PLANS AND SPECIFICATIONS:

None.

B. DESIGN RECORDS:

None

C. CONSTRUCTION RECORDS:

None.

D. MAINTENANCE:

None.

Upper Eddy Pond Dam

PREVIOUS INSPECTION REPORTS

An inspection of the dam was performed by the Vermont Department of Water Resources on May 22, 1952, and is on file at the offices of the Water Quality Division, Montpelier, VT 05602. Copy attached.

Upper Eddy Pond Dam

10/20/74
afm

INSPECTION REPORT
ON
Eddy Pond (Upper) Dam

1. Date of inspection 5/22/52 2. Water conditions normal

GENERAL DATA:

3. Location of dam Mussey Br., Rutland town
4. Owner and operator Eddy Ice Co.
5. Characteristic features of dam earth dam with core wall
about 150' long - 20' high - spillway notch in center on rock fill
6. Other related data Pond area = 6 acres Volume = 1,500,000 cu. ft.
D.A. = 3 sq. mi. Use - formerly ice now recreation.

OBSERVATIONS:

7. Condition of structure seepage at maximum section
in a few places -
spillway end walls & slab are cracked.
Rock fill supporting channel appears stable.
8. Condition of equipment none
9. Operation maximum pond for recreation
10. Maintenance Poor

REMARKS:

Dam on brook discharging thru
Rutland City.

Inspected by SL 1d

**A. SKETCHES COMPILED DURING PHASE I INSPECTION SHOWING
GENERAL LAYOUT OF DAM, TYPICAL SECTIONS AND DETAILS
OF SIGNIFICANT FEATURES:**

Figure 1. General Plan of Damsite and Typical Sections

B. RECORD PLANS:

None.

Upper Eddy Pond Dam

APPENDIX C

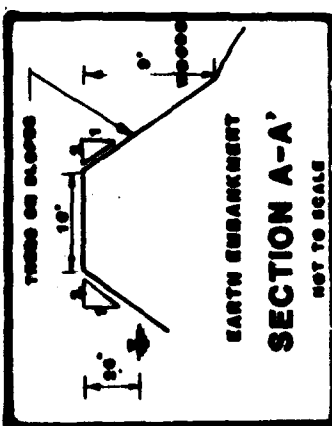
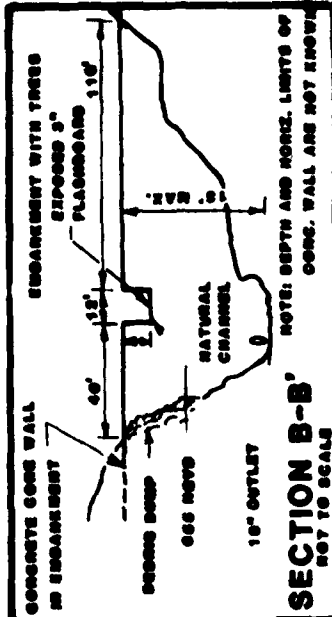
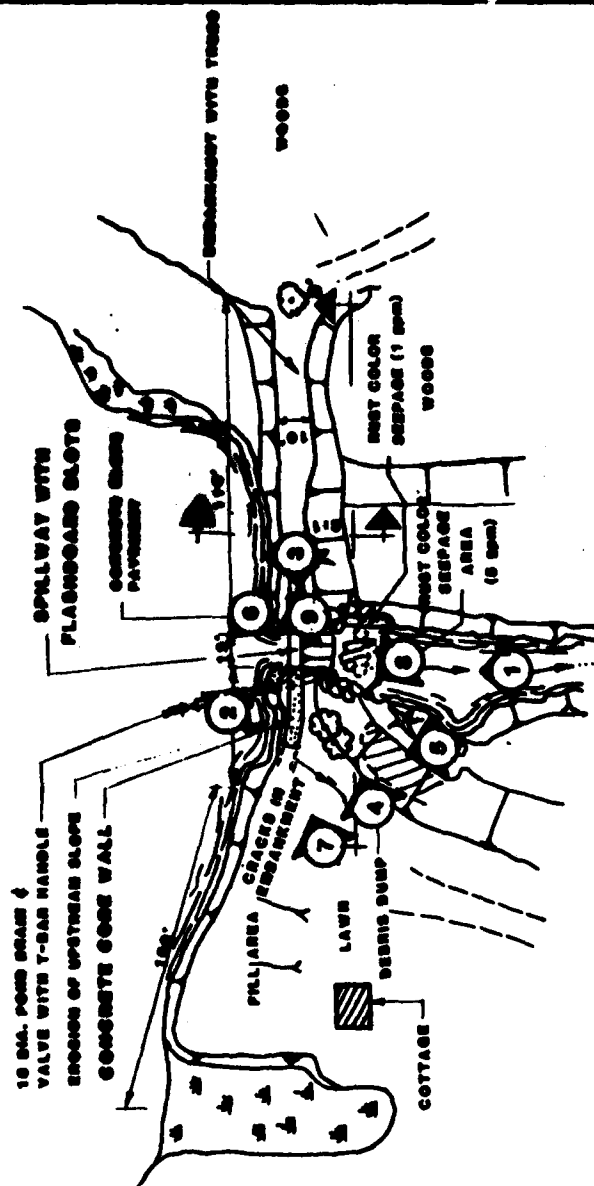
PHOTOGRAPHS

	<u>Page Number</u>
Photograph Index	C-1
Photographs	C-2 to C-7

UPPER EDDY POND ELEV. 666 MGS

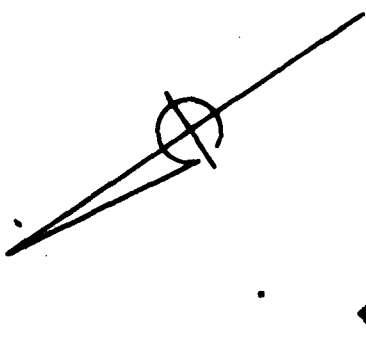
PHOTO NO. 10 TAKEN AT OLD SITE
NEAR 666' ELEVATION
PHOTO NO. 11 TAKEN AT OLD SITE
NEAR 666' ELEVATION

10
11



NOTE: Direction of flow is toward upper corner of Upper Eddy Pond as shown on sketch below, W. Conduits

Drawing is based on rough measurements taken during visual inspection



INDICATES PHOTOGRAPH NUMBER AND DIRECTION IN WHICH PHOTO WAS TAKEN

PHOTOGRAPH INDEX

APPENDIX C-1

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

ROBERT A. BROWN & ASSOCIATES, INC.
Pittsfield, Massachusetts

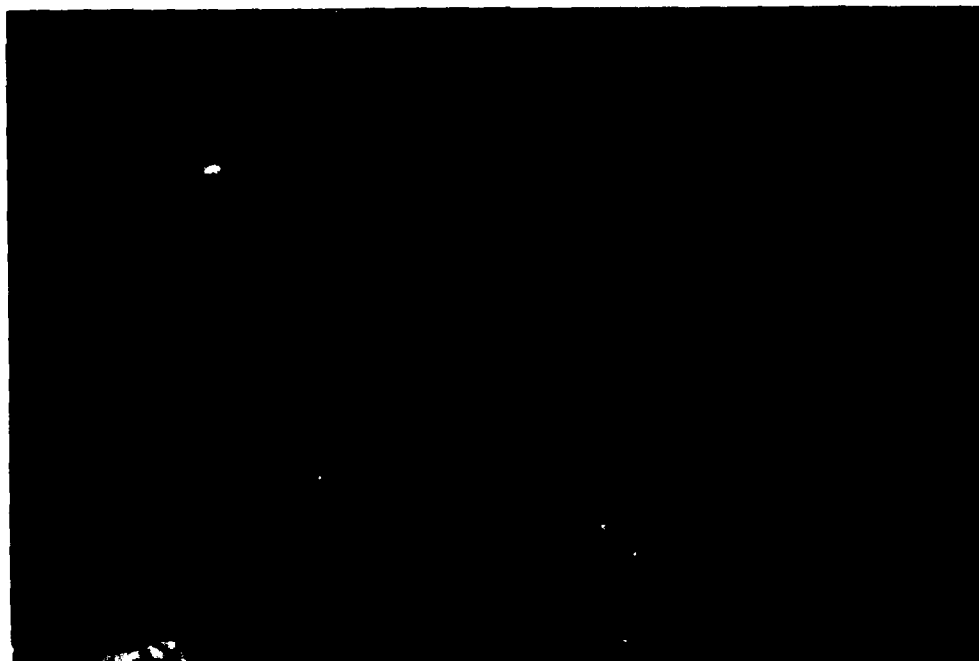
NATIONAL PROGRAM FOR
INSPECTION OF NON-FEDERAL DAMS
UPPER EDDY POND DAM
VT 00231

WUTLAND HUSSEY BROOK VERMONT

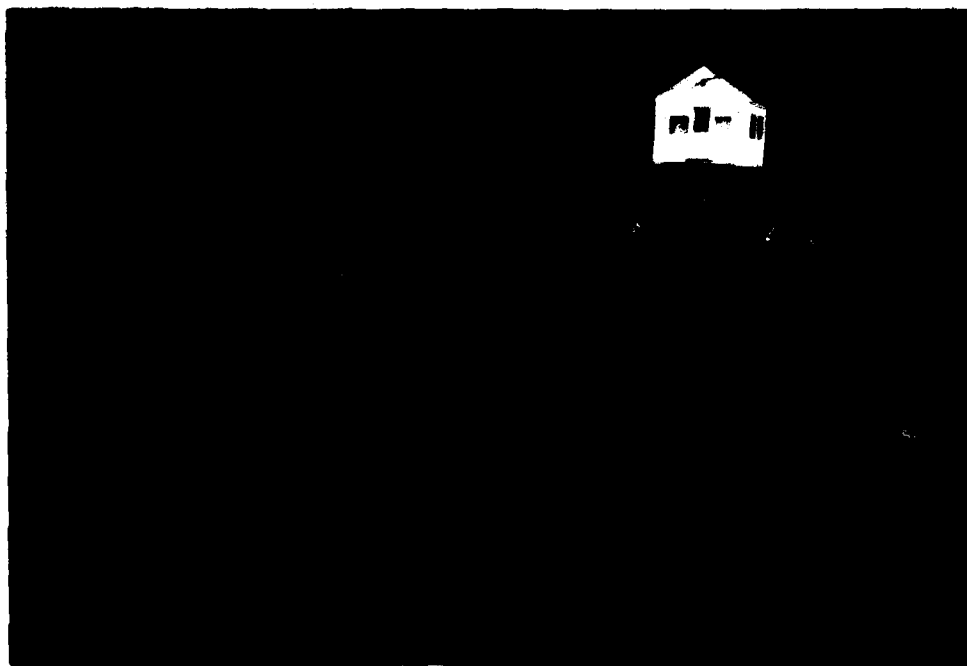
SCALE: NOT TO SCALE DATE: FEB 1931



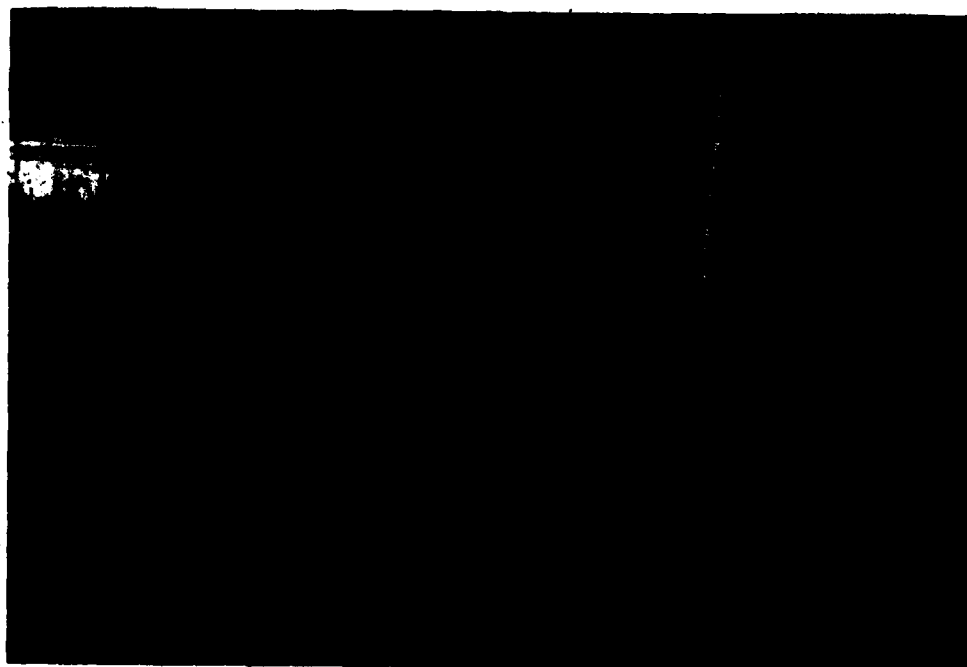
Photograph 1 - Spillway looking upstream. Note accumulated debris in spillway channel. Also note 21-inch conduit in lower left.



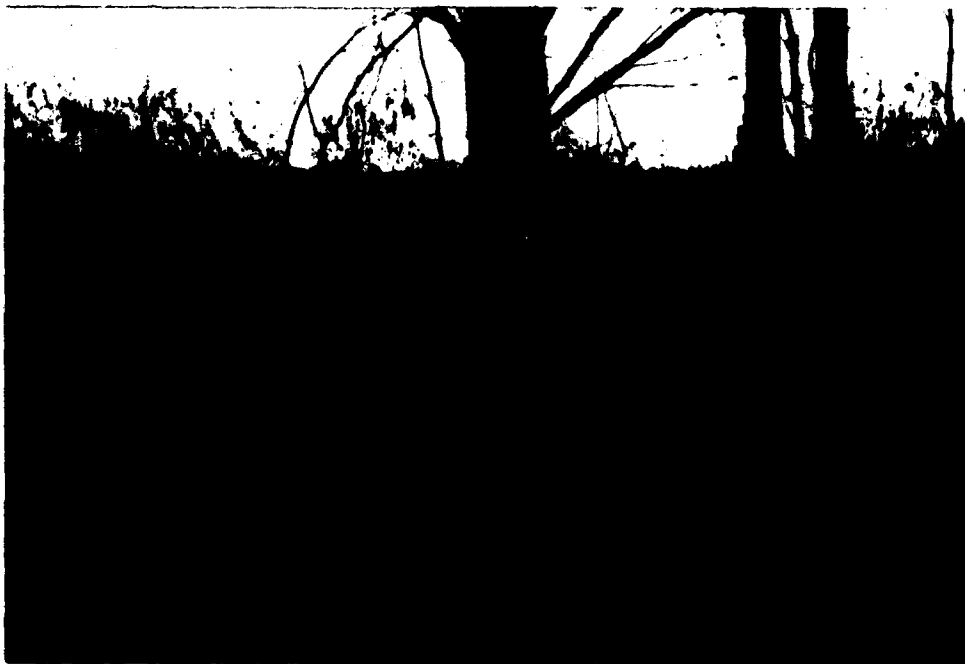
Photograph 2 - Crest looking east showing spillway and exposed sections of concrete core wall. Note slope pavement on upstream slope at approach to spillway. There is 3" of exposed flashboard above the concrete spillway crest.



Photograph 3 - Crest looking west showing spillway and exposed sections of concrete core wall.



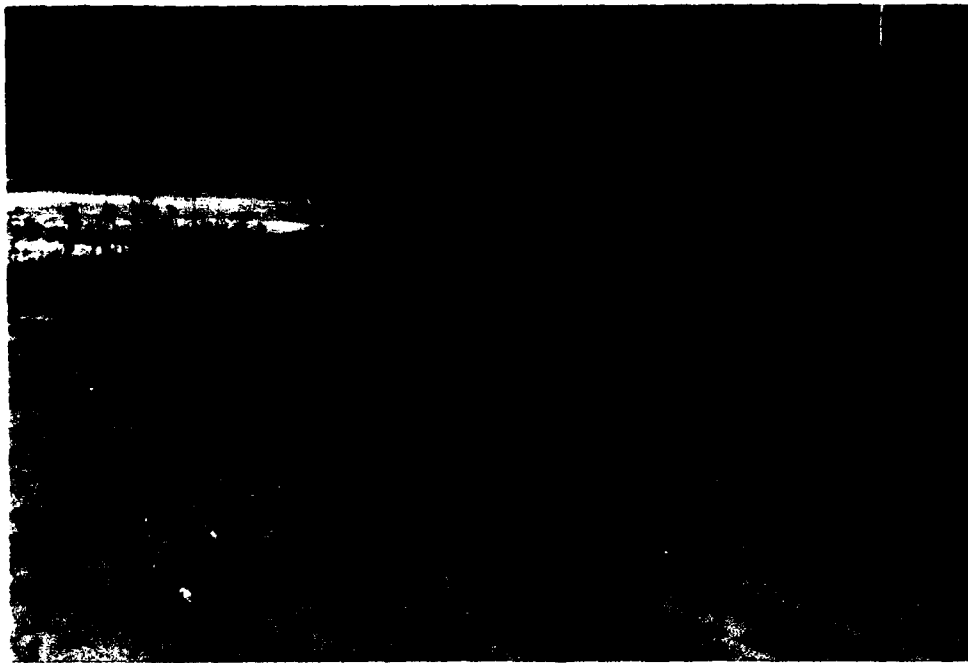
Photograph 4 - View of rubbish dump on the downstream slope of westerly embankment. Note large trees growing in embankment. The electrical work mounted on the tree in the foreground is not appurtenant to the dam.



Photograph 5 - Close up view of rubbish dump at downstream slope of westerly embankment and westerly abutment.



Photograph 6 - View of the downstream channel showing rubbish dump at right. Note concrete pavement downstream of spillway crest.



Photograph 7 - One foot deep cracks in the embankment crest, at the westerly abutment.



Photograph 8 - Area of rust color seepage at the toe of the westerly embankment in the area of the rubbish dump.



Photograph 9 - View of Upper Eddy Pond looking upstream of the dam.
Note Tee-bar handle for pond drain.



Photograph 10 - Culvert crossing at Cold River Road/Stratton Road
about 800 feet downstream of the damsite.

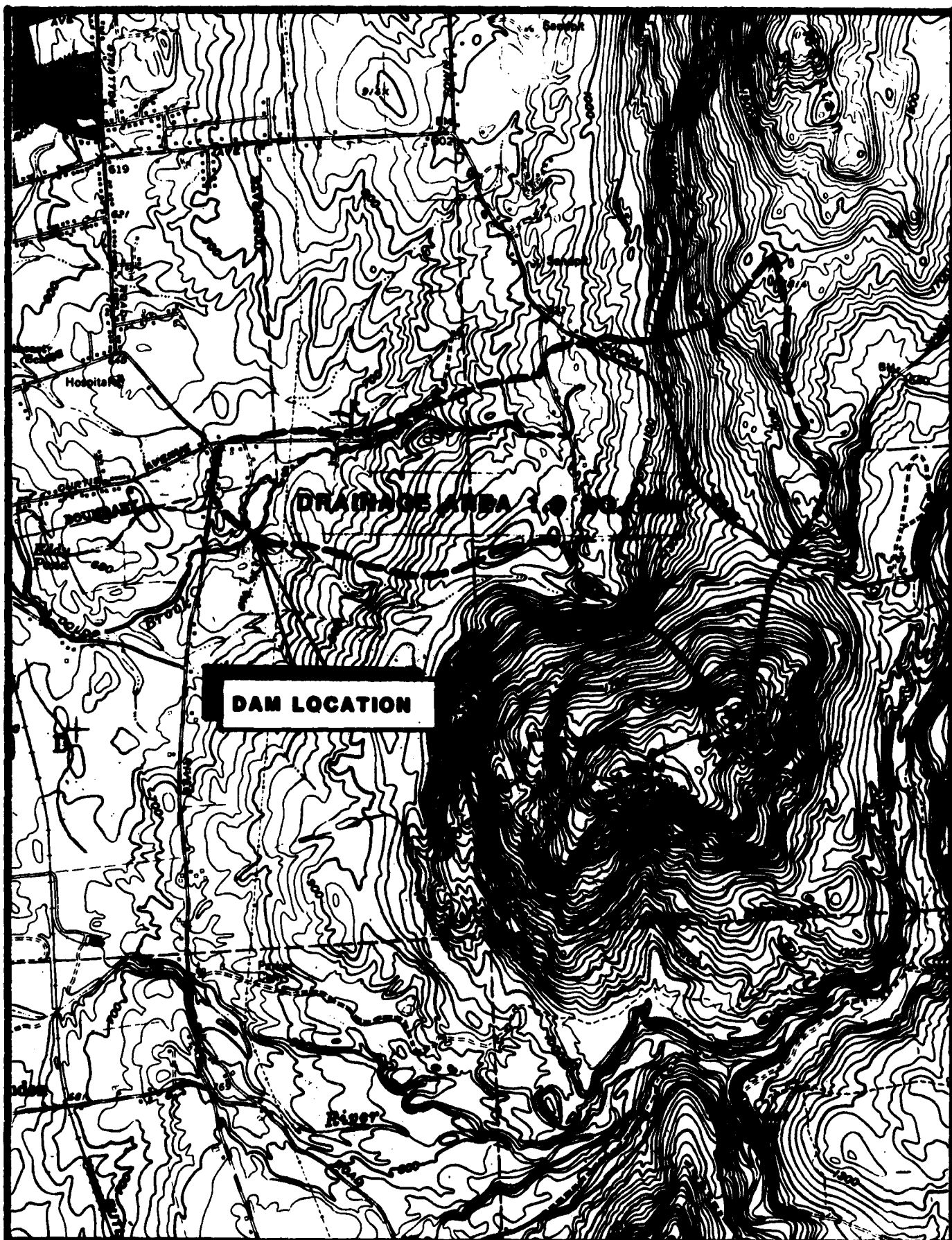


Photograph 11 - Concrete box culvert crossing at Cold River Road, 3500 feet downstream of the damsite. There is also a residential structure to the left of the photograph.

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

	<u>Page Number</u>
DRAINAGE AREA MAP	D-1
COMPUTATIONS	D-2 to D-11



UPPER EDDY POND DAM

RUTLAND, VT.

Identification No. VT 00231



APPENDIX D-1

Rutland Quadrangle
DRAINAGE AREA MAP

1:24000

Robert G. Brown & Associates, Inc.
Berkshire Common - Third Floor North
PITTSFIELD, MASSACHUSETTS 01201
(413) 498-1580

JOB Vt 231 Upper Eddy Pond Dam
SHEET NO. 1 OF 10
CALCULATED BY JFC DATE 2/5/81
CHECKED BY JMC DATE 2/7/81
SCALE _____

Drainage Area : 1.0 sq. Mi. ✓

Size - Small

Hazard - Significant

Test Flood Range - 100yr to 1/2 PMF

Test Flood - 100yr because vol. at low end of storage range

Note - The 100yr flood will be considered as comparable in magnitude to 1/4 PMF

Calculate PMF using "Preliminary Guidance for Estimating Maximum Probable Discharges in Phase I Dam Safety Inspections" March 1980

Use curve value about 1/3 distance between curves for Rolling Terrain and Mountainous Terrain

$$CSM_{PMF} = 2250 \text{ ✓}$$

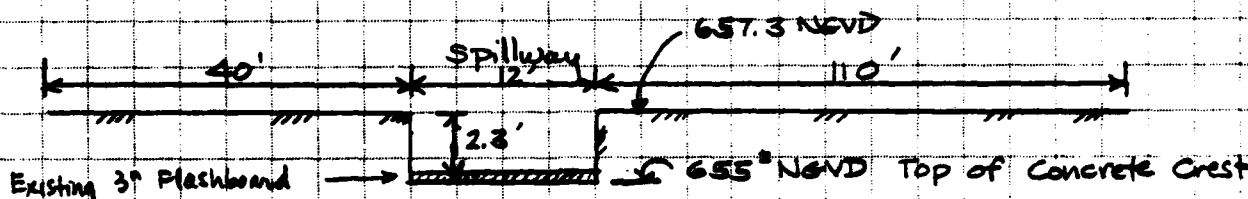
$$PMF = \frac{2250 \text{ cfs}}{\text{sq. mi.}} \times 1 \text{ sq. mi.} = 2250 \text{ cfs} \text{ ✓}$$

$$1/2 \text{ PMF} = \frac{2250}{2} = 1125 \text{ cfs} \text{ ✓}$$

$$1/4 \text{ PMF} = \frac{2250}{4} = 562 \text{ cfs} \text{ ✓ say } 550 \text{ cfs} \text{ ✓}$$

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JOB Vt 231 Upper Eddy Pond Dam
SHEET NO. 2 OF 10
CALCULATED BY JFC DATE 2/5/81
CHECKED BY JMC DATE 2/7/81
SCALE _____



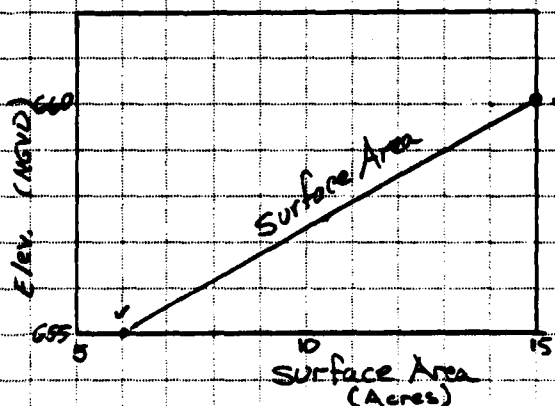
Stage v. Discharge Data

Using $Q = C H^{3/2}$ - Weir flow through spillway and over dam
- outlet conduit assumed closed.
- 3" flashboard assumed removed.

Elev	Flow Thru Spillway				Flow over Dam				Q _{TOTAL}
	C	L	H	Q	C	L	H	Q	
655	3.1	12'	-	-	-	-	-	-	-
656			1'	37'					37'
657.3			2.3'	130'	2.9'	150'	-	-	130'
658			3'	193'			0.7'	255'	448'
659			4'	298'			1.7'	964'	1262'

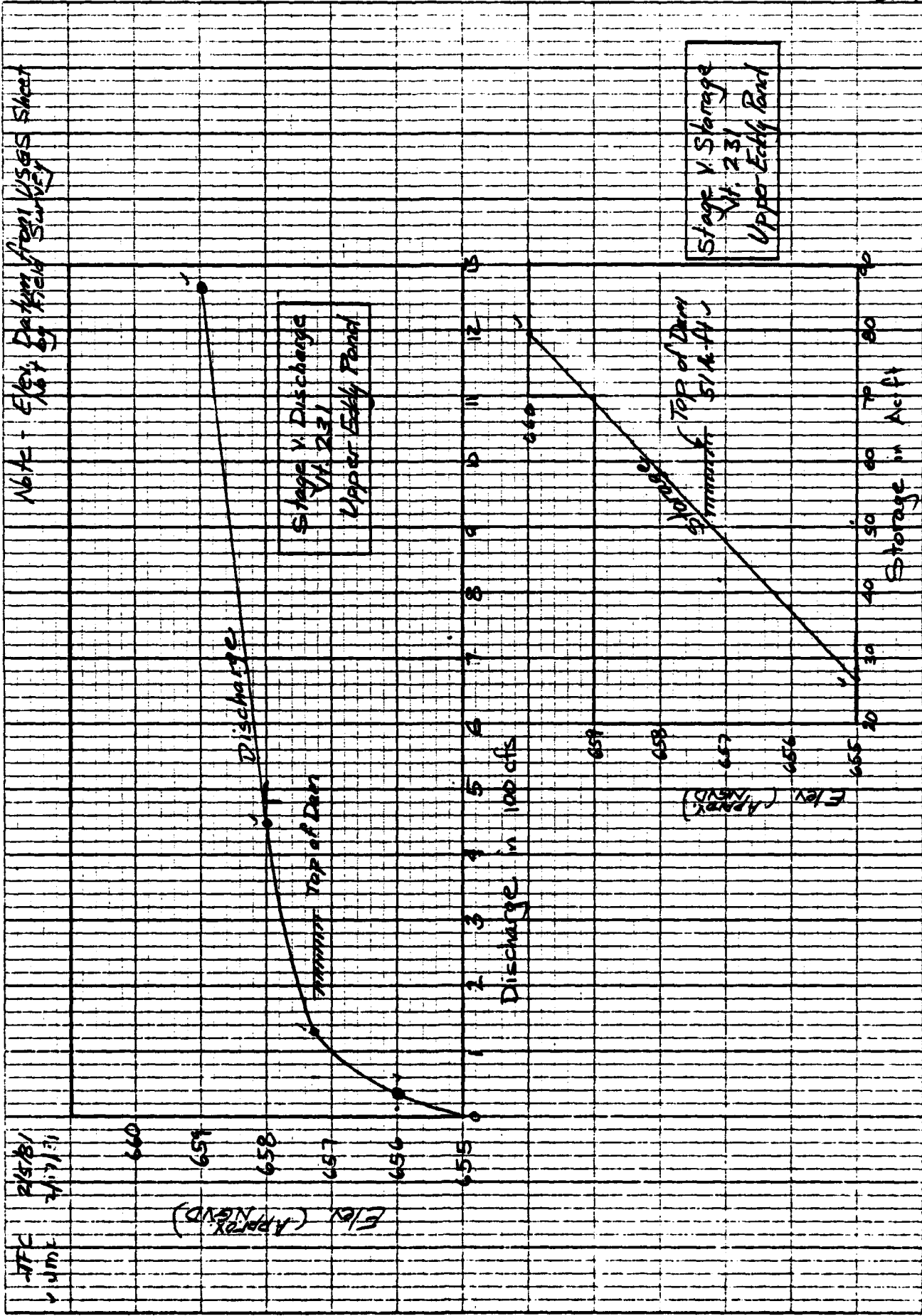
Stage v. Storage Data

Elev	Surf Area (Ac)	Δ Storage (Ac·ft)	Σ Storage (Ac·ft)
655	6'		26.4'
660	15'	53'	79.4'



Normal Storage est. based
on ave. depth = 0.4 max
ave. depth = $0.4 \times 11 = 4.4'$
Stor. = $4.4' \times 6 \text{ Ac} = 26.4 \text{ Ac·ft}$

NOTE - Elev. Datum from USGS Sheet No. 4 by Field Survey



$$\frac{1}{4} \text{ PMF Test Flood} = 550 \text{ cfs} = Q_p \rightarrow 658.1 \text{ NGVD} \rightarrow 60 \text{ A.c.ft} \checkmark$$

$$Q_{P_2} = Q_p (1 - \frac{\text{STOR}}{194})$$

$$\text{Storage at } 655 \text{ NGVD} = 26 \text{ A.c.ft} \checkmark$$

$$\Delta \text{Storage} = 60 - 26 = 34 \text{ A.c.ft} \checkmark$$

$$\text{SDR}_1 = \frac{34 \text{ A.c.ft} \times \frac{1}{1 \text{ sq. M.}} \times \frac{1 \text{ sq. M.}}{53.3 \text{ A.c.ft}} = 0.64" \checkmark$$

$$Q_{P_2} = 550 (1 - \frac{0.64}{194}) = 476 \text{ cfs} \rightarrow 658.0' \rightarrow 58 \text{ A.c.ft} \checkmark$$

$$\Delta \text{Storage} = 32 \text{ A.c.ft} \checkmark$$

$$\text{SDR}_2 = \frac{32 \text{ A.c.ft} \times \frac{1}{1 \text{ sq. M.}} \times \frac{1 \text{ sq. M.}}{53.3 \text{ A.c.ft}} = 0.60" \checkmark$$

$$\text{SDR}_{\text{AVE}} = \frac{\text{SDR}_1 + \text{SDR}_2}{2} = \frac{0.64 + 0.60}{2} = 0.62" \checkmark$$

$$0.62" \times 1 \text{ sq. M.} \times \frac{53.3 \text{ A.c.ft}}{1 \text{ sq. M.}} = 33 \text{ A.c.ft} \checkmark$$

$$(26 + 33 \text{ A.c.ft}) \rightarrow 59 \text{ A.c.ft} \rightarrow 658.0' \rightarrow 480 \text{ cfs} \checkmark$$

Summary

Test Flood -
 Inflow $\frac{1}{4} \text{ PMF} - 550 \text{ cfs} \checkmark$

Router Outflow - $480 \text{ cfs} \checkmark$

Test Flood Elev. - $658.0 \text{ NGVD} \checkmark$

Storage at Test Flood El. - $59 \text{ A.c.ft} \checkmark$

Spillway Cap at
 Test Flood Elev. - $193 \text{ cfs w/ } 3' \text{ head} \checkmark$

Top of Dam El. $657.3 \text{ NGVD} \checkmark$

Spillway Cap at
 Top of Dam $130 \text{ cfs} \checkmark$

% of Router
 Test Flood Outflow $27\% \checkmark$

Depth of
 Overtopping $0.7' \checkmark$

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JOB Vt. 231 Upper Faldy Pond Dam
SHEET NO. 5 OF 10
CALCULATED BY JFC DATE 2/5/81
CHECKED BY Jmc DATE 2/17/81
SCALE _____

Breach Analysis

W_b @ 40% length at Mid-ht =
 $0.4 \times 90' = 36'$

Assume breach when water is at top of dam

$$Q_p = 8/27 W_b \sqrt{g} y_o^{3/2}$$

$$y_o = 13'$$

$$Q_p = (8/27)(36)(32.2)^{1/2}(13)^{3/2} = 2837 \text{ cfs} \checkmark$$

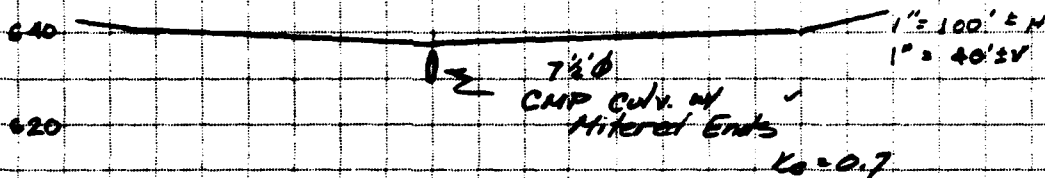
Plus Spillway Flow 130 cfs ✓

Total Breach $Q = 2967 \text{ cfs} \checkmark$

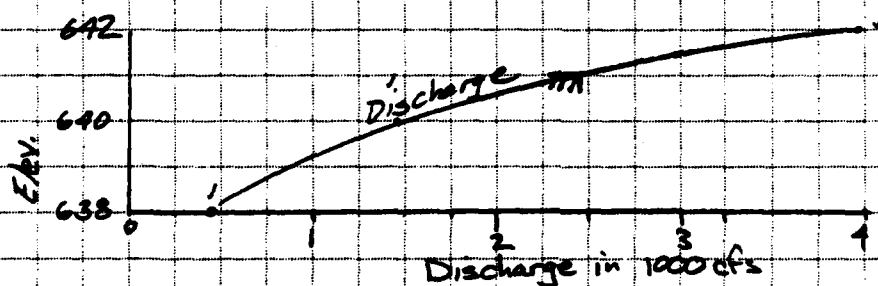
$S = \text{Vol. of Storage at Top of Dam} = 51 \text{ Acft} \checkmark$

Downstream Analysis

Culvert Crossing 800' Downstream of Cold River Rd /
Stratton Rd
 $Q_p = 2967 \text{ cfs}$



Elev	Orifice			Weir				Q TOTAL cfs
	h	h/D	Q	C	L	H	Q	
638	8'	1.1'	425'					425'
640	10'	1.3'	475'	3.0	175	1.5'	964'	1439'
642	12'	1.6'	550'			3.5'	3438'	3988'



2.8hc Area ✓
x (8' to 4') area depth
94c ft ✓

$$V_1 = 9 \text{ ac-ft @ } 6415 \text{ NGVD}$$

$$Q_{P2} = Q_p (1 - \frac{V_1}{s}) = 2967 (1 - \frac{9}{51}) = 2443 \text{ cfs} \checkmark$$

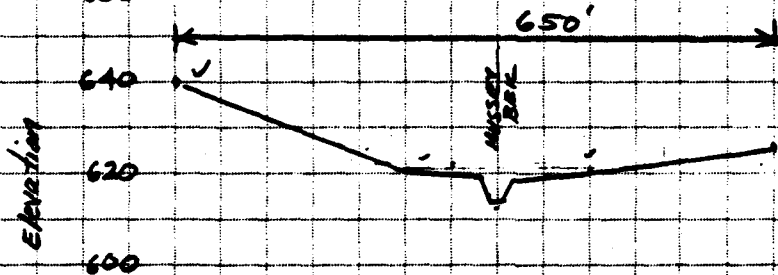
$$V_2 = 7.6 \text{ ac-ft}$$

$$V_{ave} = \frac{9 + 7.6}{2} = 8.3 \checkmark$$

$$Q_{P2} = Q_p (1 - \frac{V_{ave}}{s}) = 2967 (1 - \frac{8.3}{51}) = 2484 \text{ cfs} \checkmark$$

about 2' flooding over ✓
road, no houses

Analyze Section 2000' Downstream of Dam
 Using $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$ $n = 0.03$, Slope $S = \frac{20/2600'}{2600'} = \frac{1}{130}$
 $S^{1/2} = 0.877$

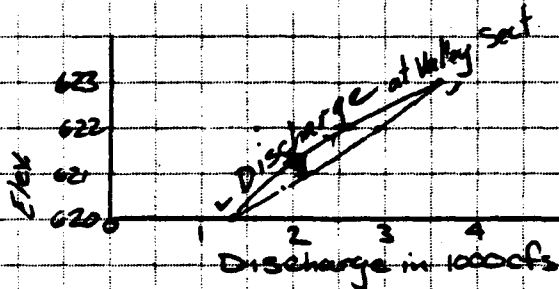


$Q_p = 2484 \text{ cfs}$

Section Looking US
 (1200' DS of culvert at Col R. Rd.)

Elev	Area	Wb	R_h	Q	Depth
620	120'	30'	4.0'	1318'	6'
622	290'	250'	1.8	2900'	8'
623	550'	300'	1.8	3541'	9'

Note assume uniform section
 from Col R. Rd. to this
 Point



$$V_1 = \frac{450}{290 \text{ ft}^2 \times 1200 \text{ ft}} = \frac{12.4}{43560 \text{ ft}^2} = 8 \text{ Ac-ft @ } 622$$

$$Q_{p2} = Q_p (1 - \frac{V_1}{5}) = 2484 (1 - \frac{8}{5}) = 2094 \text{ @ } 622$$

$$V_2 = \frac{255}{200 \text{ ft}^2 \times 1200 \text{ ft}} = \frac{6.5}{43560 \text{ ft}^2} = 5.5 \text{ Ac-ft}$$

$$V_{ave} = \frac{6.5 + 8}{2} = 7.2 \text{ Ac-ft}$$

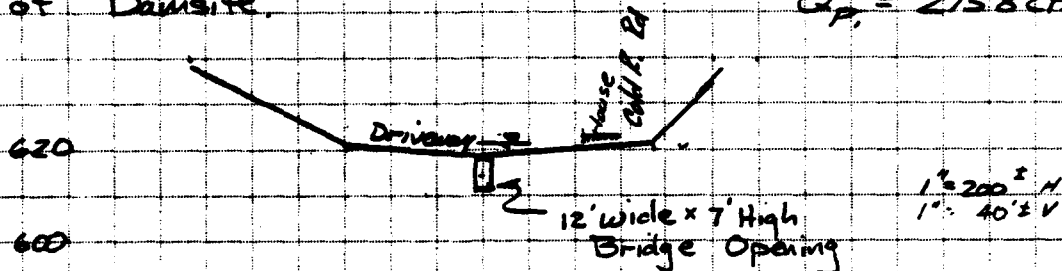
$$Q_p = 2484 (1 - \frac{7.2}{5}) = 2158 \text{ cfs}$$

@ 621.5 NGVD
 7.5' Depth

No houses at this
 location

Note Could be some backwater
 from DS bridge if bridge opening
 controls but water surf. elev. about same

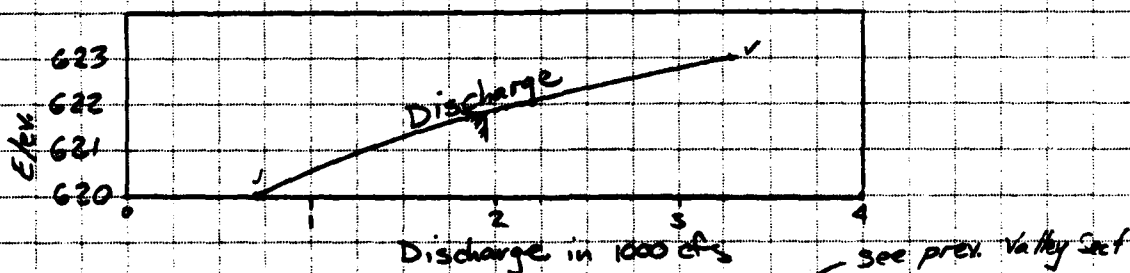
Analyze private bridge crossing 3000' Downstream of Dam site. $Q_p = 2158 \text{ cfs}$



Section Looking US.

Rate Bridge as Box Culv. w/ Inlet Control (Orifice)

Elev	h _w	h _w /D	Q	C	L	H	Q	Q _{TOTAL}
620	8'	1.1'	720'	2.9	150	0	-	720
622	10'	1.4'	910'	"	"	2'	1230'	2140'
623	11'	1.6'	1030'	"	"	3'	2260'	3290'



See prev. Valley Sect
 $V_1 = \frac{290 \text{ ft}^2}{43560} = 6.6 \text{ Ac ft} \checkmark @ 622$

$Q_2 = Q_p (1 - \frac{V_1}{5}) = 2158 (1 - \frac{6.6}{5}) = 1878 \text{ cfs}$

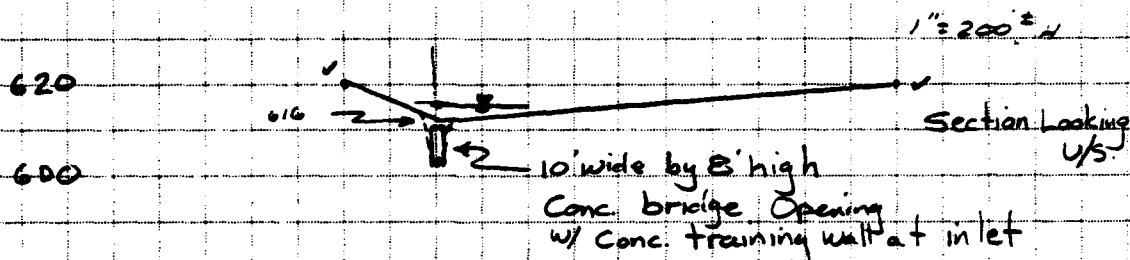
$V_2 = \frac{230 \text{ ft}^2}{43560} = 5.3 \text{ Ac ft} \checkmark$

$V_{ave} = \frac{5.3 + 6.6}{2} = 6.0 \text{ Ac ft} \checkmark$

$Q_p = 2158 (1 - \frac{6}{5}) = 1909 \text{ cfs} \checkmark$

Shallow Flooding up to 2' around house in this location - Probably wouldn't reach sill elev.

Analyze Bridge Opening at Cold River Rd
3500' Downstream of Dam
 $Q_p = 1904 \text{ cfs}$



Rate Bridge as Box Culv. w/ Inlet Control (Orifice)

Elev	h	hw/D	Q	C	L	H	Q	Q _{TOTAL}
606	9'	1.1	750					750
617	10'	1.3	900	29	100	1	290	1190
618	11'	1.4	1000		"	2	820	1820
618.5			1000	"	"	2.5	1146	2146

1 house could be flooded by about 1.5' above first floor and 1 house could be flooded by about 3 1/2' above first floor. Other houses are more than 2' above the road level.

Below this area brook crosses Cold River Road again in a 7'x10' CMP Arch Culvert before entering Lower Eckly Pond - Vt 230.

Notes regarding downstream hazard

1. Road crossing 800' downstream of dam would probably be damaged by washout.
2. A private bridge about 3000' downstream could be damaged. There is a home at this location. There could be flooding around this home but water would probably not reach the first floor unless the bridge opening became blocked.

3. At a point 3500' downstream of the dam the breach flow would be attenuated by approximately 35%.

1 house could be flooded by about 1.5' above first floor and 1 house could be flooded by about 3 1/2' above first floor. Other houses are more than 2' above the road level.

Because of the potential for property damage and because of the potential for loss of a few lives in the Cold River Road area, the dam has been classified Significant Hazard.

4. Mussey Brook enters Lower Eddy Pond 4500' Downstream of the dam site.

APPENDIX E

**INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS**

NOT AVAILABLE AT THIS TIME

END

FILMED

9-85

DTIC